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Influence of High-Pressure Processing and Antioxidants on the Quality of Beef Patties

A.S. Leaflet R2054

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Summary and Implications

The combination of high pressure and a natural antioxidant (rosemary extract) on the quality of beef patties was studied during refrigerated storage for up to 9 days. Addition of rosemary extract has shown some promising results such as improvement in redness and reduction in lipid oxidation in pressurized samples along with storage effect.

Introduction

The main criterion that dictates the market value of meat products is texture and sensory quality such as color. Lipid oxidation is one of the factors that brings undesirable changes to sensory quality and can be avoided by addition of antioxidant. High pressure processing (HPP) is a non thermal food processing that can be used to increase shelf life of food products while maintaining their nutritional quality. HPP can however affect color and lipid oxidation. This study was carried out to determine the effect of HPP and antioxidant on color, texture and chemical quality indices (TBARS) in beef patties.

Materials and Methods

Beef patties (approx. 26 g) were prepared from boneless chuck rolls and divided into two batches; Control (Cont) and patties containing antioxidant - rosemary extract at 3,000 ppm (R10). The samples were blast frozen, sliced, vacuum packed and pressurized from 0.1 (untreated) to 600 MPa at 10°C for 10 minutes using a Food-Lab 900 High-Pressure Food Processor. Samples were removed from packs and wrapped with oxygen permeable films storage study. The samples were evaluated for changes in color (L^* and a^*), lipid oxidation

(TBARS). Textural quality of cooked patties was determined after 1 and 9 day of refrigerated storage (5-7°C).

Results and Discussion

Quality parameters of beef patties containing or not rosemary extract and pressurized at 200, 400, and 600 MPa are summarized in Table 1 and Figure 1. Although HPP did not induce lipid oxidation in either of the samples on day 1 of storage (Figure 1), lipid oxidation was found to increase in control samples as storage proceeded. The highest lipid oxidation was noted for the control sample after treatment at 600 MPa. Combining rosemary extract with pressure resulted in lower TBARS values during further storage.

At pressures ≥ 400 MPa a slight increase of the lightness (L^*) was observed but these changes were stabilized during further storage (Table 1). Interestingly redness (a^*) of the rosemary samples was improved on day 9 compared to day 1 especially in samples pressurized at 400 and 600 MPa. Increase in pressure level caused a significant increase in hardness of the sample that was maintained during storage.

We have shown that the addition of rosemary extract can improve the appearance of pressurized beef patties and reduce lipid oxidation that might otherwise participate in the deterioration of sensory of meat patties.

Figure 1. Influence of HPP and rosemary extract on the TBARS values in beef patties

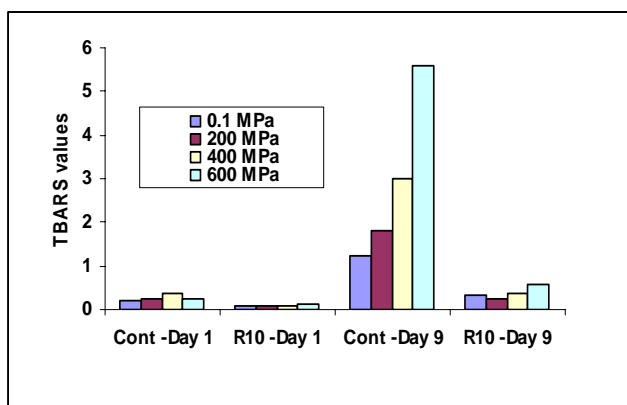


Table 1. Changes in color characteristics and texture in pressurized beef patties during refrigerated storage

Treatment Group	Pressure (MPa)	Day 1			Day 9		
		L*	a*	Hardness	L*	a*	Hardness (g)
Control	0.1	44.9	13.6	3007	49.8	11.2	3678
	200	48.9	12.6	3516	53.1	9.4	4253
	400	53.3	9.9	3557	52.6	10.3	3763
	600	54.2	9.4	4106	48.5	11.0	4638
Rosemary	0.1	48.0	12.2	3002	50.0	10.6	3669
	200	50.5	12.2	3489	51.9	12.8	3769
	400	54.7	8.6	3989	52.6	13.0	4182
	600	54.8	8.3	3805	49.7	10.9	4529